CLAIMS

1. A satellite for routing signals on 0 to n channels to any one of M downlink beams, said satellite comprising:

n first-stage switches each corresponding to one of the 0 to n channels;

M multiplexing devices each to combine n/2 channels into one output channel;

M second-stage switches to receive outputs from said M multiplexing devices; and

M downlink antenna ports coupled to said M second-stage switches.

2. The satellite of claim 1, wherein each of said n first-stage switches comprises an M/2 output mechanical switch or set of switches.

3. The satellite of claim 1, wherein each of said M second-stage switches comprises a two-output mechanical switch.

4. The satellite of claim 1, further comprising a receive antenna or a plurality of receive antennas to receive a beam or set of beams each on a channel or set of channels.

5. The satellite of claim 4, further comprising means for routing each of a plurality of beams from corresponding ones of said receive antenna or antennas to said n first-stage switches.

6. The satellite of claim 1, wherein said signals relate to broadband communications.

7. The satellite of claim 1, further comprising a control unit to control operation of at least said n first-stage switches and said M second-stage switches such that each signal is routed to a desired one of said M downlink antenna ports.

8. A satellite mechanism for routing 0 to n signals to any one of M downlink beams, said satellite mechanism comprising:

a plurality of first switching devices each to route an input signal to at least one of two outputs;

a plurality of multiplexing devices to receive inputs from said plurality of first switching devices and to provide a plurality of output signals; and

a plurality of second switching devices each corresponding to one of said plurality of multiplexing devices and provided to receive said plurality of output signals, each of said plurality of second switching devices to route a received signal to one of M antenna ports.

9. The satellite mechanism of claim 8, wherein said plurality of first switching devices comprise n first-stage switches each corresponding to one of 0 to n channels, said plurality of multiplexing devices comprises M multiplexing

devices each to combine n/2 channels into one output channel, said plurality of second switching devices comprises M second-stage switches to receive outputs from said M multiplexing devices.

10. The satellite mechanism of claim 8, wherein said plurality of first switching devices comprises an M/2 output mechanical switch or set of switches.

11. The satellite mechanism of claim 8, wherein said plurality of second switching devices comprise two-output mechanical switches.

12. The satellite mechanism of claim 8, wherein one of said plurality of second switching devices comprises a three-output switch to route a received signal to one of a test port and a desired antenna port.

13. The satellite mechanism of claim 8, further comprising a receive antenna or plurality of receive antennas to receive a beam or plurality of beams each on a channel or set of channels.

14. The satellite mechanism of claim 13, further comprising means for routing each of said plurality of beams from corresponding ones of said receive antenna or receive antennas to said plurality of first switching devices.

15. The satellite mechanism of claim 8, wherein said signals relate to broadband communications.

16. The satellite mechanism of claim 8, further comprising a control unit to control operation of at least said plurality of first switching devices, said plurality of multiplexing devices and said plurality of second switching devices.

17. A switching mechanism for routing signals from up to n channels to any one of M downlink beams, said switching mechanism comprising:

means for receiving a plurality of uplink signals each corresponding to one of n channels; and

means for directing signals corresponding to each of said uplink signals to one of M downlink antenna ports.

18. The switching mechanism of claim 17, wherein said means for directing signals comprises n first-stage switches each corresponding to one of 0 to n channels, M multiplexing devices each to combine n/2 channels into one output channel, and M second-stage switches to receive outputs from said M multiplexing devices.

19. The switching mechanism of claim 18, wherein said n first-stage switches and said M second-stage switches are configured to minimize insertion losses.

20. A method of routing signals on a satellite, said method comprising:

receiving signals on 0 to n channels; and

routing said signals to any one of M downlink antenna ports.

21. The method of claim 20, wherein routing said signals comprises passing said signals through n first-stage switches, using M multiplexing devices each to combine n/2 channels into one output channel, receiving outputs from said M multiplexing devices at M second-stage switches, and passing said signals through said M second-stage switches.

22. A method of routing n signals to any one of M downlink antenna ports on a satellite, said method comprising:

receiving said n signals each corresponding to a different channel; and

directing each of said signals to one of said M downlink antenna ports using n first-stage switches, M multiplexing devices and M second-stage switches.

23. The method of claim 22, wherein directing each of said signals comprises passing said signals through said n first-stage switches, using M multiplexing devices each to combine n/2 channels into one output channel, receiving outputs from said M multiplexing devices at said M second-stage switches, and passing said signals through said M second-stage switches.